PACIFIC SOUTHWEST
Forest and Range
Experiment Station

FOREST SERVICE
U.S.DEPARTMENT OF AGRICULTURE
P.O. BOX 245, BERKELEY, CALIFORNIA 94701

BLACK TWIG BORER . . . a tree killer in Hawaii

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USDA Forest Service
Research Note PSW-274
1972

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Abstract: The black twig borer *(Xylosandrus compactus* Eichhoff*)*, first discovered in Hawaii in 1961, has become widespread on many host plants throughout the islands. Beetle infestations have caused heavy damage to trees but only recently have attacks been associated with death of apparently vigorous trees in forest stands. The beetle and its associated microorganisms have been identified as associated with the death of five tree species in planted forests on Oahu.

Oxford: 453–145.7 k19.92 *Xylosandrus compactus:* 176.1 spp. [–(969) + (969)].
Retrieval Terms: Xylosandrus compactus; Tristania conferta; Syncarpia glomulifera; Melaleuca leucadendron; Eucalyptus sideroxylon; plantation stands; *Eucalyptus pilularis;* insect damage; Hawaii; crown mortality; tree mortality.

The black twig borer *(Xylosandrus compactus* Eichhoff*)* and associated microorganisms have killed a small number of trees of several species planted in windward Oahu, Hawaii. This is the first report of the death of well-established, large trees in Hawaii that can be attributed to these organisms. Clifton J. Davis and other entomologists have previously confirmed the association of this insect with the killing of small trees and shrubs in Hawaii.

In early December 1971, Robert E. Nelson noticed dead tree crowns in several small patches of planted forests on the lower northeast flank of Mount Olomana. The planted stands affected were of five species: brushbox *(Tristania conferta),* turpentine-tree *(Syncarpia glomulifera),* paper-bark *(Melaleuca leucadendron),* red-ironbark eucalyptus *(Eucalyptus sideroxylon),* and blackbutt eucalyptus *(E. pilularis).* Examination of the dead trees showed that twigs and branches were heavily attacked by what appeared to be the black twig borer.

In January 1972, we examined several trees of all species in these stands. After specimens were collected, the black twig borer was positively identified as heavily infesting both dead and live trees and was associated with killed twigs and branches. No cause of tree death other than this insect pest and associated microorgamisms could be determined from these examinations of tree trunks and root crowns.

The first known infestation of the black twig borer in Hawaii was discovered in November 1961, at Kailua, Oahu,[1] just a few miles from the infestation reported in this note. Since then the beetle has become widespread throughout the Hawaiian Islands. Hobdy[2] reported the association of the black twig borer with mortality and dieback of *Eucalyptus robusta* trees during drought periods on severe sites on the island of Kauai. Host plants of this insect pest now number more than 65, ranging from orchids to large trees.[3] These reports suggest that the black twig borer may become a serious threat to forests in the

Hawaiian Islands. The specific conditions under which it can cause extensive damage and the identity and role of associated microorganisms are not known and need to be investigated in detail.

SPECIES AFFECTED BY INFESTATIONS

The infested patches of forest were probably planted in the 1930's. They are on ridges, side slopes, and swales, on generally steep topography. Soils are variable, from moderately deep to shallow and rocky. Elevation ranges from 200 to 400 feet. Annual rainfall averages about 40 inches.

We found that several species of understory shrubs were also heavily infested, including koa haole *(Leucaena glauca),* guava *(Psidium guajava),* vervain *(Stachytarpheta jamaicensis),* and Christmasberry *(Schinus terebinthifolia).* Koa haole is one of the preferred hosts of the black twig borer. Because this shrub is common in this area, it has probably contributed to the population buildup, leading to subsequent and persistent attacks on large trees. Our study of the species affected showed the following:

- Paper-bark: many of the trees with completely killed crowns had healthy cambium tissue and were sprouting vigorously along their trunks. In spite of heavy infestations, few trees examined were dead. Paper-bark trees were mostly less than 10 inches diameter breast height (d.b.h.) and up to 35 feet tall. The few dead trees found were smaller than average.
- Red-ironbark: several of the trees with dead crowns were sprouting vigorously along their trunks, but others were dead. A few had their crowns killed many months previously, with subsequent trunk sprouts which had then recently died. Large and apparently vigorous trees had been killed, such as one 16 inches d.b.h. and another 11 inches d.b.h., both nearly 60 feet tall. On some twigs beetles were found trapped in gum exuded from the bore hole.
- Turpentine-trees: some of the trees with completely dead crowns and trunks had one or more vigorous sprouts several feet tall rising from the root crown. However, the size of the sprouts and the fact that many trees with healthy crowns also had such sprouts make it unlikely that sprouting was necessarily associated with the beetle attacks. Turpentine-trees growing in mixture with paper-bark trees suffered heavier mortality from beetle attacks than did the paper-bark trees. Yet, a pure stand of turpentine-trees had only a few killed trees. Elsewhere, a group of six turpentine-trees were killed, but one tree in the middle of the group appeared healthy. Large, apparently vigorous trees were killed; one was nearly 50 feet tall and 13 inches d.b.h.
- Brushbox and blackbutt: Trees with dead crowns were not sprouting. The cambium tissue was dead on the lower trunks. All killed trees examined had apparently been vigorous before the beetle attacks. One killed brushbox was 12 inches d.b.h. and 39 feet tall. A killed blackbutt tree was 16 inches d.b.h. and 60 feet tall.

BLACK TWIG BORER

The black twig borer is native to Asia, but has wide geographical distribution. Its range includes Africa, and Malaysia as well as Hawaii. In North America, it is found only in Florida.

Twigs and branches are usually the preferred targets of adult beetles and, in many instances, only one to three beetles and their brood are sufficient to kill the twig or branch. Dieback of affected twigs and branches follows, spreading throughout the tree in some species. In some species, the beetle will attack the bole of sapling or pole size trees.

Incipient infestations are often difficult to detect in the live branches. But as the leaves wither and turn yellowish-brown, infestations are readily detected and confirmed.

The work of the black twig borer in the tree species reported here is typical of that described elsewhere.[4] Beetles bore into twigs or small branches, up to about 1/2 inch in diameter. Live beetles are found in twigs of both live and dead trees. Successful borings penetrate into the pith, where the beetle excavates a brood gallery. Many beetle borings are not completed, some barely started, then abandoned. The physical damage done by the boring beetle is minor, relative to the size of most twigs attacked. Yet any boring activity, even shallow starts, can kill the twig. Almost invariably, stain and lesions from fungus or other organisms are associated with borer holes and twig death.

NOTES

[1]Beardsley, J. W. *The black twig borer, a potentially serious pest of coffee new to Hawaii.* Haw. Farm Sci. 13(1): 5-6. 1964.

[2]Hobdy, Robert. *Report on mortality and dieback of Eucalyptus robusta.* Hawaii Div. For., Forest Manage. Note, Kauai, No. 1, 2 p. 1966.

[3]Davis, C. J. *Black twig borer threatens native trees.* Newsletter, Haw. Bot. Soc. 9(5): 38-39. 1970.

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